

WE CLAIM:

1. A crosslinked biocompatible material comprising at least one ionically crosslinked component; and at least one covalently crosslinked component, wherein the ionically crosslinked component is selected from a polysaccharide, a polyanion, or a polycation.

2. The crosslinked biocompatible material of claim 1 wherein the ionically crosslinked component is alginate.

3. The crosslinked biocompatible material of claim 2 wherein the alginate is a high G block alginate having at least 60% α-L-guluronic acid.

4. The crosslinked biocompatible material of claim 3 wherein the α-L-guluronic acid comprises at least 70% α-L-guluronic acid.

5. The crosslinked biocompatible material of claim 2 further comprising a biologic encapsulated by the material.

6. The crosslinked biocompatible material of claim 5, wherein the material is effective to provide immunoprotection for the biologic in a psychological environment.

7. The crosslinked biocompatible material of claim 6, wherein the material provides immunoprotection of the biologic when xenotransplanted.

8. The crosslinked biocompatible material of claim 5, wherein the biologic is a biologically active material or a diagnostic marker.

9. The crosslinked biocompatible material of claim 8, wherein the biologically active materials are living cells selected from islet of Langerhans, dopamine secreting cells,

erythropoietin secreting cells, nerve growth factor secreting cells, parathyroid cells, or norepinephrine/-metacephalin secreting cells.

10. The crosslinked biocompatible material of claim 8, wherein the biologically
5 active material is a drug.

11. A crosslinked biocompatible material comprising:
at least one ionically crosslinked component; and at least one covalently
crosslinked component is derived from a polyalkylene oxide.

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12. The crosslinked biocompatible material of claim 11, wherein the covalently
crosslinked component is polyethylene glycol diacrylate.

13. The crosslinked biocompatible material of claim 11, further comprising a
15 biologic encapsulated by the material.

14. The crosslinked biocompatible material of claim 13, wherein the material is
effective to provide immunoprotection for the biologic in a physiological environment.

15. The crosslinked biocompatible material of claim 14, wherein the material
20 provides immunoprotection of the biologic when xenotransplanted.

16. The crosslinked biocompatible material of claim 13, wherein the biologic is a
biologically active material or a diagnostic marker.

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17. The crosslinked biocompatible material of claim 16, wherein the biologically
active materials are living cells selected from the islets of Langerhans, dopamine secreting
cells, erythropoietin secreting cells, nerve growth factor secreting cells, hepatocytes,
adrenaline/angiotensin secreting cells, parathyroid cells, or norepinephrine/metacephalin
30 secreting cells.

18. The crosslinkable biocompatible material of claim 16, wherein the biologically active material is a drug.

5 19. A crosslinkable biocompatible mixture comprising:
at least one ionically crosslinkable component; and at least one covalently crosslinkable component, wherein the ionically crosslinkable component is selected from a polysaccharide, a polyanion, or polycation.

10 20. The crosslinkable biocompatible mixture of claim 19, wherein the ionically crosslinkable component is alginate.

21. The crosslinkable biocompatible mixture of claim 20, wherein the alginate is capable of ionically crosslinking by adding multivalent cations to the mixture.

15 22. The crosslinkable biocompatible mixture of claim 19, wherein the composition ratio between the ionically crosslinkable component and the covalently crosslinkable component is effective for the stable crosslinking of the mixture, whereby a gelled encapsulation material is formed.

20 23. The crosslinkable biocompatible mixture of claim 22, wherein the concentration and the molecular weight(s) of the covalently crosslinkable component are effective to provide immunoprotection to the encapsulated functional core once the mixture has been crosslinked.

25 24. The crosslinkable biocompatible mixture of claim 23, wherein the mixture has an osmolarity and pH compatible with the living tissue or cells.

25. The crosslinkable biocompatible mixture of claim 24, wherein the osmolarity of the mixture is about 290 milliosmoles per kilogram and the pH is about 7.4.

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26. The crosslinkable biocompatible mixture of claim 23, wherein the concentration and molecular weight(s) of the covalently crosslinkable component are effective for the controlled release of the biologic or components of the biologic once the mixture has been crosslinked.

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27. A crosslinkable biocompatible mixture comprising:
at least one ionically crosslinkable component; and at least one covalently crosslinkable component, wherein the covalently crosslinkable component is a polyalkylene oxide.

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28. The crosslinkable biocompatible mixture of claim 27, wherein the polyalkylene oxide is capable of covalently crosslinking by free radical polymerization.

29. The crosslinkable biocompatible mixture of claim 27, wherein the polyalkylene oxide is polyethylene glycol diacrylate.

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30. The crosslinkable biocompatible mixture of claim 27, wherein the composition ratio between the ionically crosslinkable component and the covalently crosslinkable component is effective for the stable crosslinking of the mixture, whereby a gelled encapsulation material is formed.

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31. The crosslinkable biocompatible mixture of claim 30, wherein the concentration, and the molecular weight(s) of the covalently crosslinkable component are effective to provide immunoprotection to the encapsulated functional core once the mixture has been crosslinked.

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32. The crosslinkable biocompatible mixture of claim 31, wherein the mixture has an osmolarity and pH compatible with living tissue or cells.

33. The crosslinkable biocompatible mixture of claim 32, wherein the osmolarity of the mixture is about 290 milliosmoles per kilogram and the pH is about 7.4.

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34. The crosslinkable biocompatible mixture of claim 31, wherein the concentration and molecular weight(s) of the covalently crosslinkable component are effective for the controlled release of the biologic or components of the biologic once the mixture has been crosslinked.

35. A retrievable implantation material, comprising:
a crosslinked biocompatible macrocapsule comprising at least one ionically crosslinked component, and at least one covalently crosslinked component, whereby said macrocapsule encapsulates a microcapsule(s) of a biologic.

36. The retrievable implantation material of claim 35, wherein the macrocapsule provides immunoprotection to the encapsulated microcapsule(s) or biologic when xenotransplanted.